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DYNAMICS OF COMPETITIVENESS OF INDONESIAN ESSENTIAL OIL EXPORTS AND MAIN EXPORTING COUNTRIES IN THE CHINESE MARKET

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Abstract. Indonesia is one of the largest producers of essential oils globally, yet its export competitiveness in the Chinese market faces fluctuations. This study aims to analyze the level and dynamics of the competitiveness of Indonesian essential oil exports compared to major exporting countries in the Chinese market. The research utilizes secondary time-series data from 2011 to 2023 obtained from Trade Map. The competitiveness analysis is conducted using the Revealed Comparative Advantage (RCA) and Dynamic Revealed Comparative Advantage (DRCA) methods. The results indicate that Indonesia has a strong competitiveness level, although with fluctuating trends. Indonesia was categorized as a rising star in 2011–2013 and 2017–2019 but experienced a decline to the lagging retreat position in 2021–2023. The fluctuating competitiveness is influenced by unstable production, limited product innovation, and quality standards that do not fully meet market needs. To enhance competitiveness, Indonesia needs to strengthen its product quality, adopt technological innovations, and foster stakeholder collaboration.

Keywords: Competitiveness, DRCA, Essential Oil, RCA, Chinese Market

INTRODUCTION

Essential oils represent one of Indonesia's leading export commodities, possessing high economic value and experiencing growing demand in the global market. Classified under medicinal plants, aromatics, and spices, essential oils contributed an export value of US\$465.1 million in 2023 (Badan Pusat Statistik, 2023). As one of the world's primary producers, Indonesia faces significant challenges in sustaining and enhancing its competitiveness amid intensifying global competition. One of the main export destinations for Indonesian essential oils is China.

China ranks among the world's major importers of essential oils, with demand steadily increasing, particularly from the cosmetics, pharmaceutical, and food industries. According to data from the Observatory of Economic Complexity (OEC), China imported essential oils worth US\$407 million in 2021, ranking third after the United States and France. However, this figure declined to US\$342 million in 2022, placing China as the fourth largest importer after the United States, France, and Germany. This strong demand is driven by sustained economic growth, rising consumer awareness of natural products (Turek & Stintzing, 2013), and the increasing popularity of essential oils in personal care, traditional medicine, and premium food sectors among the expanding middle class (Mora, 2022).



Figure 1. Export Market Share of Essential Oils by Exporting Countries in the Chinese Market in 2023

Based on Trade Map data (2024), Indonesia is one of the top five essential oil exporting countries in the Chinese market in 2023. Where Germany is the first country exporting essential oils with a percentage of 29 percent in the Chinese market. France is second with a percentage of 22 percent, Bulgaria is third with a percentage of 20 percent, Indonesia is fourth with a percentage of 6 percent and the United States is fifth with a percentage of 3 percent and the rest is exported from other countries with a percentage of 20 percent (Figure 1).

The essential oils exported by Indonesia to China are classified under HS code 33019090. This code refers to essential oil concentrates products that have undergone processing to remove most of the solvent components or other non-essential materials, resulting in a highly concentrated oil rich in active compounds. The production of these concentrates typically involves methods such as steam distillation or solvent extraction, yielding oils with high potency and purity.

Table 1. Volume and Value of Indonesian Essential Oil Exports in the Chinese Market

Year	Volume (Kilogram)	Value (000 US\$)
2019	26281	1064
2020	25139	1273
2021	38200	1894
2022	4500	400
2023	19032	584

Source: Trade Map (2024)

Based on data from Trade Map (2024), the volume of Indonesian essential oil exports from 2019 to 2022 fluctuated, although in 2022 there was a significant decline. In the last five-year period (2019-2023), Indonesia was able to export essential oils with an average of 14175.8 kilograms with an average value of 1043 thousand US\$. It was recorded that the high balance of Indonesian essential oil exports occurred in 2021 at 1,894 thousand US\$, while the lowest balance of Indonesian essential oil exports occurred in 2022 at 400 thousand US\$.

However, despite having a comparative advantage as an essential oil producing country, the competitiveness of Indonesian essential oil exports in the Chinese market has fluctuated. Based on data from Trade Map (2024), Indonesia's essential oil market share in China tends to be unstable and has decreased significantly in 2022 before increasing again in 2023. This shows that the dynamics of Indonesia's essential oil competitiveness in the Chinese market are influenced by various factors, including changes in trade policies, consumer preferences, and competition with major exporting countries such as Germany, France, and Bulgaria.

Huda *et al.* (2021) revealed that Indonesian patchouli oil had a high and consistent RCA value during 2001–2018, indicating strong competitiveness compared to its main competitors. Nurcahyani & Salqaura (2023) also found that Indonesian essential oils have a high

comparative advantage due to consistent quality and price advantages. Kartika *et al.* (2023) emphasized that RCA helps understand the dynamics of competition and the strategic position of essential oil exports, while Puspita *et al.* (2021) highlighted Indonesia's great potential in meeting global demand, despite facing stiff competition from Brazil, India, and America which placed Indonesia in 11th position as an essential oil exporter in 2018. However, the sustainability of this competitiveness is also influenced by trade policies, production innovation, and improvements in product quality and added value.

Based on the description above, previous studies only focused on the competitiveness of Indonesian essential oils and there are still few studies that analyze the dynamics of competitiveness in Indonesian essential oil exports. Previous studies also analyzed the competitiveness of Indonesian essential oils in the international market and there are still few studies that focus on essential oil exports in specific markets such as the Chinese market. In previous studies, the HS codes used were more in the four-digit and six-digit HS codes, while the eight-digit HS code where the exported products are more specific such as essential oil concentrates is still very rare.

Based on the explanation, this study aims to analyze the level of competitiveness and dynamics of the competitiveness of essential oils between major exporting countries in the Chinese market. There are five major exporting countries in the Chinese market, namely Germany, France, Bulgaria, Indonesia and the USA. As well as making strategic efforts by providing policy recommendations to increase the competitiveness of Indonesian essential oils in the Chinese market.

METHODS

Types and Sources of Data

The data used in this study are secondary data in the form of time series from 2011 to 2023 obtained from Trade Map. The data included includes data on the value of essential oil exports (US\$) in major exporting countries, namely Germany, France, Bulgaria, Indonesia and the USA. The total value of all commodities in major exporting countries of essential oils, the export value of essential oils in the Chinese market and the total export value of all commodities in the Chinese market. The essential oils analyzed in this study are essential oils with the Harmonized System (HS) code 33019090 (Concentrants in fats, etc.; terpenic by products, aqs distillates; of essentials oil).

Data Analysis Method

Revealed Comparative Advantage (RCA)

The Revealed Comparative Advantage (RCA) method is used to assess the relative competitiveness of an export commodity in the international market. RCA was introduced by Balassa (1965), and has become a popular method for identifying a country's comparative advantage in a particular commodity compared to other countries in the global market. With RCA, it can be seen whether a commodity from a particular country has a comparative advantage or not. The RCA value is calculated using the following formula:

$$RCA = \frac{X_{ij} / \sum_j X_{ij}}{X_{wj} / \sum_j X_{wj}}$$

Description:

RCA = Competitiveness of a country towards a commodity

X_{ij} = Export value of commodity j in country i (US\$)

$\sum_j X_{ij}$ = Total export value of all commodities from country i (US\$)

X_{wj} = Export value of commodity j in the world (US\$)

$\sum_j X_{wj}$ = Total export value of all commodities (US\$)

RCA calculates the comparison of a commodity's export share from one country to the commodity's export share at the global level. The RCA value ranges from 0 to infinity (20). If the RCA value is more than 1, the commodity is competitive because its export share in the country is higher than its share in the world market. Conversely, if the RCA is below 1, the commodity is not competitive.

Hinloopen and Van Marrewijk (2001), and Erkan and Yildirimci (2015), grouped RCA value into four categories:

1. $0 < RCA \leq 1$: Not competitive
2. $1 < RCA \leq 2$: Weak competitiveness
3. $2 < RCA \leq 4$: Medium competitiveness
4. $RCA > 4$: Strong competitiveness

Dynamic Revealed Comparative Advantage (DRCA)

The Dynamic Revealed Comparative Advantage (DRCA) method is a development of RCA that considers changes in RCA values over a period of time. DRCA is used to analyze the dynamics or trends of competitiveness over time, making it suitable for studying changes in the competitiveness of certain products in the long term. DRCA is calculated by calculating the difference in RCA between periods, or it can also be done by using the percentage change in RCA. In general, the formula is:

$$DRCA = \frac{\Delta RCA}{RCA} = \frac{\Delta \left(\frac{X_{ij}}{\sum_j X_{ij}} \right)}{\frac{X_{ij}}{\sum_j X_{ij}}} - \frac{\Delta \left(\frac{X_{wj}}{\sum_j X_{wj}} \right)}{\frac{X_{wj}}{\sum_j X_{wj}}}$$

Description:

DRCA = Change in a country's competitiveness towards a commodity

X_{ij} = Export value of commodity j in country i (US\$)

$\sum_j X_{ij}$ = Total export value of all commodities from country i (US\$)

X_{wj} = Export value of commodity j in the world (US\$)

$\sum_j X_{wj}$ = Total export value of all commodities (US\$)

The DRCA method, according to Edwards and Schoer (2002) and Özçelik and Erlat (2013), is a method used to analyze changes in the competitiveness of a commodity over a certain period of time. Edwards and Schoer emphasize that DRCA can help assess a country's ability to maintain or improve its comparative advantage dynamically and identify trends in increasing or decreasing competitiveness of certain commodities, so that policy and development strategies can be formulated to improve the competitiveness of a country's export products.

Table 2. Dynamics of Export Market Position

RCA	Growth of Share of Commodity j in country i		Growth of Commodity Share j in world exports	Export Market Position	Export Evaluation
Naik	↑	>	↑	Rising Stars	Successful Restructring
	↑	>	↓	Falling Stars	Poor Restructring
	↓	>	↓	Lagging Reatreat	Poor Restructring
	↓	<	↑	Lost Opportunity	Poor Restructring
Turun	↓	<	↓	Leading Reatreat	Successful Restructring
	↑	<	↑	Lagging Opportunity	Poor Restructring

Source: Edwards and Schoer (2002); Özçelik and Erlat (2013)

RESULTS AND DISCUSSION

Competitiveness of Essential Oils

Table 3. RCA Value (Competitiveness) of Essential Oil Exports of 5 Main Exporting Countries

Year	RCA Value of Major Exporting Countries				
	Germany	France	Bulgaria	Indonesia	USA
2011	1.514	15.1	78.4	0.5	8.2
2012	2.447	33.4	268.4	4.8	12.3
2013	0.877	74.1	247.3	4.4	5.7
2014	0.541	26.9	703.8	19.2	8.0
2015	0.976	27.6	1.001.3	37.5	9.5
2016	1.164	26.1	1.896.2	17.6	4.0
2017	0.929	41.7	5.255.6	10.5	7.8
2018	2.059	26.0	1.855.3	23.8	10.7
2019	4.946	21.2	2.117.9	27.6	8.2
2020	24.081	29.1	1.207.3	31.5	11.8
2021	17.824	17.1	786.8	20.1	1.5
2022	21.754	27.0	1.133.6	2.7	0.9
2023	17.043	49.4	1.132.6	5.8	1.3
Average	6.6	30.4	1.379.3	16.7	7.4

Source: Processed 2025

Competitiveness analysis using the Revealed Comparative Advantage (RCA) method is used to assess a country's superiority in exporting certain commodities. This method reflects a country's trade specialization based on the share of commodity exports compared to the share of global exports. The higher the RCA value, the greater the contribution of the commodity's exports to the country's foreign exchange earnings. Based on the highest RCA value, the five main countries that dominate essential oil concentrate exports to the Chinese market are Germany, France, Bulgaria, Indonesia, and USA.

Based on data from the ITC Trade Map (2024) and the Indonesian Ministry of Trade (2023), Table 2 shows that the five countries with the highest export competitiveness of essential oils in the Chinese market are Bulgaria, France, Indonesia, the United States, and Germany. During the period 2011–2023, Bulgaria recorded the highest average RCA value, namely 1,379.3, followed by France at 30.4, in third place Indonesia at 16.7, in fourth place the United States at 7.4 and in fifth place Germany at 6.6. The five countries have RCA values above four, indicating that the five countries are highly competitive.

Bulgaria has a very strong competitiveness in essential oil exports, as reflected by the much higher RCA value compared to other countries. This shows that essential oil exports are a leading sector that contributes significantly to the country's foreign exchange (ITC Trade Map, 2023). France also has high competitiveness, which is due to the large demand in the essential oil-based perfume and cosmetics sector (ITC Trade Map, 2023).

Indonesia has a fairly strong export competitiveness of essential oils with an average RCA value of 16.7 during 2011–2023. This competitive advantage is influenced by the availability of abundant raw materials and Indonesia's position as one of the world's main producers of essential oils (FAO, 2023). Despite having supportive climate conditions, this competitiveness fluctuates due to production factors, selling prices, and competition with other commodities such as coffee, rubber, and palm oil (Idris, 2014). The highest RCA was recorded in 2015 at 37.5, driven by increasing global demand and product diversification, while the lowest value

occurred in 2011 at 0.5 due to a decrease in exports which only reached US\$ 161,025,700, lower than in subsequent years. This fluctuation indicates the need for a strategy to increase production efficiency, price stability, and product diversification to strengthen Indonesia's competitiveness in the global market.

USA and Germany have lower competitiveness compared to Bulgaria and France. However, both remain important competitors in the essential oil industry, especially as producers of derivative products such as perfumes, cosmetics, and pharmaceuticals (ITC Trade Map, 2023). Germany's relatively stable RCA value indicates that the country still maintains its role in the global trade of essential oils. The trend in RCA values during the study period shows that Bulgaria fluctuates, but remains at a very high level. In contrast, Indonesia and France have more stable competitiveness, reflecting the resilience of their essential oil industries in facing global market dynamics (ITC Trade Map, 2023).

Indonesia's strong competitiveness has a great opportunity to increase essential oil exports by implementing strategies such as improving product quality, diversifying essential oil variants, and strengthening market penetration through trade agreements and international promotions. In addition to price and export volume factors, the competitiveness of essential oils is also influenced by meeting the quality standards set by the destination country. China as one of the main markets imposes strict quality requirements, such as pure essential oil content, cleanliness, and ¹contaminant-free laboratory tests. Compliance with these requirements is one of the strategies to increase the competitiveness of Indonesian essential oils in the Chinese market (Kementerian Perdagangan RI, 2025).

Table 4. Competitive Position of Indonesian Essential Oil Exports and Main Competitor Countries in the Chinese Market in the First Period (2011-2013)

Country	Growth of Essential Oil Export Share	Growth of Essential Oil Share in China's Exports	Export Market Position
Germany	-0.30770	0.19495	lost opportunity ^{**}
France	4.86862	0.19495	rising stars [*]
Bulgaria	2.76932	0.19495	rising stars [*]
Indonesia	10.36825	0.19495	rising stars [*]
USA	-0.17552	0.19495	lost opportunity ^{**}

Description: *) Successful restructuring ; **) Poor restructuring

During the period 2011–2013, the competitiveness of Indonesian essential oils increased significantly, as evidenced by Indonesia's classification as a "rising star" in the Chinese market indicated by a market share growth rate exceeding the global average. The primary driving factors behind this growth were the ease of export procedures and the upward trend in prices, which incentivized producers to boost both production and exports (Rosiana *et al.*, 2017). In the same period, France and Bulgaria also held "rising star" positions; Bulgaria offered more competitive pricing, while France maintained superior product quality (Guerra, 2023). In contrast, Germany and the United States experienced a decline in market share and were categorized as "lost opportunities," primarily due to higher production costs, increased price competition from developing countries such as Indonesia, and shifting market preferences in China (Tripathi *et al.*, 2016).

This shift in market dynamics during the early 2010s highlights the growing competitiveness of developing countries in the essential oils sector, especially in expanding markets like China. Indonesia, Bulgaria, and France succeeded by adapting through competitive

pricing, quality improvements, and efficient supply chains. In contrast, Germany and the United States struggled due to high production costs and limited market adaptability. These trends emphasize the need for continuous innovation and strategic positioning to maintain competitiveness in the global essential oil market.

Table 5. Competitive Position of Indonesian Essential Oil Exports and Main Competitor Countries in the Chinese Market in the Second Period (2013-2015)

Country	Growth of Essential Oil Export Share	Growth of Essential Oil Share in China's Exports	Export Market Position
Germany	0.02743	-0.07717	falling stars ^{**}
France	-0.65631	-0.07717	lagging retreat ^{**}
Bulgaria	2.73613	-0.07717	falling stars ^{**}
Indonesia	6.84645	-0.07717	falling stars ^{**}
USA	0.54376	-0.07717	falling stars ^{**}

Description: *) Successful restructuring ; **) Poor restructuring

During the period 2013–2015, the competitiveness of Indonesian essential oils remained strong but experienced a slight deceleration compared to the previous period. Indonesia continued to record positive export share growth; however, its position in the export market shifted to the "falling star" category. This indicates that although Indonesian exports were still expanding, their growth began to lag behind that of other competitors in the Chinese market. The slowdown was attributed to several factors, including intense competition from other exporting countries capable of producing essential oils at lower costs (Tempo, 2010), as well as the deceleration of China's economic growth, which led to reduced demand for essential oil imports (Media Center Riau, 2015).

Bulgaria recorded the highest growth (2.73613), but remained in the same category due to persistent competitive pressure. Germany posted modest growth (0.02743) but was also categorized as a "falling star". Meanwhile, France experienced an export contraction (-0.65631) and fell into the "lagging retreat" category, signaling a decline in its competitiveness. The United States, with a growth rate of 0.54376, was also classified as a "falling star", reflecting insufficient export growth.

Table 6. Competitive Position of Indonesian Essential Oil Exports and Main Competitor Countries in the Chinese Market in the Third Period (2015-2017)

Country	Growth of Essential Oil Export Share	Growth of Essential Oil Share in China's Exports	Export Market Position
Germany	-0.12871	-0.08430	lagging retreat ^{**}
France	0.38444	-0.08430	falling stars ^{**}
Bulgaria	3.80621	-0.08430	falling stars ^{**}
Indonesia	-0.74336	-0.08430	lagging retreat ^{**}
USA	-0.24361	-0.08430	lagging retreat ^{**}

Description: *) Successful restructuring ; **) Poor restructuring

During the period 2015–2017, the competitiveness of Indonesia's essential oil exports declined, as reflected by its classification as a "lagging retreat" in the Chinese market. The negative export share growth indicates a loss of competitiveness and a diminishing market share

in China. This decline was driven by intensified competition from other exporting countries, shifting consumer preferences in China, and limited innovation in product development and processing technologies. Additionally, the lack of product diversification and the absence of fully standardized quality measures further weakened Indonesia's position in the Chinese market (Dewan Atsiri Indonesian, 2018).

Bulgaria and France were categorized as “falling stars,” indicating that although these countries had demonstrated strong competitiveness in the previous period, their export shares began to stagnate or decline. Bulgaria continued to maintain a relatively high market share, supported by more competitive pricing, while France remained focused on delivering high-quality products. In contrast, Germany and the United States were classified as “lagging retreat,” suggesting a continued erosion of their essential oil export competitiveness. This was primarily attributed to high production costs, changes in trade policies, and increasing competition from developing countries offering more competitive prices.

Table 7. Competitive Position of Indonesian Essential Oil Exports and Main Competitor Countries in the Chinese Market in the Fourth Period (2017-2019)

Country	Growth of Essential Oil Export Share	Growth of Essential Oil Share in China's Exports	Export Market Position
Germany	6.73433	0.45273	rising stars [*]
France	-0.26118	0.45273	lost opportunity ^{**}
Bulgaria	-0.41460	0.45273	lost opportunity ^{**}
Indonesia	2.81334	0.45273	rising stars [*]
USA	0.51766	0.45273	rising stars [*]

Description : *) Successful restructuring ; **) Poor restructuring

During the period 2017–2019, Indonesia's essential oil export competitiveness improved, as indicated by its classification as a “rising star” in the global market, with an export share growth of 2.81334 percent. This improvement was driven by production stability, high demand from the perfume and cosmetics industries, and an aggressive export strategy. Furthermore, the adoption of international quality standards and innovations in production processes significantly enhanced Indonesia's competitiveness, particularly in China, its primary export destination (BISIP, 2023).

Alongside Indonesia, Germany also demonstrated strong export performance, recording the highest export share growth of 6.773433 percent, thereby securing a “rising star” position in the Chinese market. Germany's success in enhancing its export competitiveness can be attributed to product innovation, production efficiency, and effective market penetration strategies. The United States also entered the “rising star” category, although with a more modest growth rate of 0.51766 percent, indicating a moderate improvement in competitiveness.

In contrast, France and Bulgaria experienced declines in their essential oil export shares, by -0.26118 percent and -0.41460 percent respectively, placing them in the “lost opportunity” category. These declines were primarily due to increased competition from other countries particularly Indonesia and Germany and shifting market preferences toward more competitively priced products. Additionally, higher production costs and stricter export regulations may have contributed to the weakening export competitiveness of both countries.

Table 8. Competitive Position of Indonesian Essential Oil Exports and Main Competitor Countries in the Chinese Market in the Fifth Period (2019-2021)

Country	Growth of Essential Oil Export Share	Growth of Essential Oil Share in China's Exports	Export Market Position
Germany	3.57083	0.26827	falling stars ^{**}
France	0.02276	0.26827	lagging opportunity ^{**}
Bulgaria	-0.52880	0.26827	lost opportunity ^{**}
Indonesia	-0.07422	0.26827	lost opportunity ^{**}
USA	-0.76766	0.26827	lost opportunity ^{**}

Description: *) Successful restructuring ; **) Poor restructuring

During the period 2019–2021, the COVID-19 pandemic had a significant impact on the competitiveness of essential oil exports, including that of Indonesia, which experienced a decline in market share and was categorized as a “lost opportunity” due to negative export growth. Although global demand for essential oils increased driven by the rising trend in health and aromatherapy product usage during the pandemic Indonesia was unable to capitalize on this opportunity effectively. According to Prasetya *et al.* (2022), the decline was triggered by production disruptions resulting from industrial restrictions, lockdown policies that slowed distribution, and supply chain instability that led to increased logistics costs and delivery delays. Consequently, Indonesia lost market ground to other supplier countries that were more adaptive during the crisis.

Similar conditions were experienced by the United States and Bulgaria, which were also categorized as “lost opportunities,” while France was classified as “lagging opportunity,” indicating stagnant export growth. In contrast, Germany, although placed in the “falling stars” category, recorded the highest export share growth. However, this growth came with concerns regarding the sustainability of its competitiveness in the long term. The pandemic introduced new dynamics in the global essential oil trade, where countries with greater flexibility in production and distribution systems demonstrated stronger resilience, while those facing significant supply chain disruptions lost momentum in the international market.

Table 9. Competitive Position of Indonesian Essential Oil Exports and Main Competitor Countries in the Chinese Market in the Sixth Period (2021-2023)

Country	Growth of Essential Oil Export Share	Growth of Essential Oil Share in China's Exports	Export Market Position
Germany	-0.15370	-0.11489	lagging retreat ^{**}
France	1.55771	-0.11489	falling stars ^{**}
Bulgaria	0.27402	-0.11489	falling stars ^{**}
Indonesia	-0.74471	-0.11489	lagging retreat ^{**}
USA	-0.23672	-0.11489	lagging retreat ^{**}

Description: *) Successful restructuring ; **) Poor restructuring

During the period 2021–2023, Indonesia's essential oil export competitiveness declined, as reflected in its classification as a “lagging retreat,” with negative export share growth indicating a loss of market share and reduced competitiveness at the global level. The

suboptimal utilization of essential oils has contributed to the decline in Indonesia's export performance in the Chinese market. To address this issue, Indonesia needs to implement strategic measures, one of which includes establishing essential oil processing facilities that comply with domestic quality standards (Nurfauziah and Octaviani, 2021) and cater to the growing export demand.

Germany and the United States were also categorized as "lagging retreat," with negative export share growth of -0.15370 and -0.23672, respectively, reflecting weakening competitiveness due to high production costs and increased pressure from emerging economies. Meanwhile, Bulgaria and France were classified as "falling stars," indicating that although they previously held strong competitive positions, their export shares have begun to stagnate or decline. France recorded the highest export share growth (1.55771) yet remained in the "falling stars" category, possibly due to rising competition from new entrants or shifting global consumer preferences. Bulgaria, with an export share growth of 0.27402, continues to face challenges in maintaining its market position.

CONCLUSION

Indonesia's essential oil exports demonstrated strong competitiveness in the Chinese market throughout the 2011–2023 period, although they remained below those of key competitors such as Bulgaria, France, and Germany. Based on the Revealed Comparative Advantage (RCA) method, the competitiveness of Indonesian essential oils fluctuated, reaching its peak in 2015 before experiencing a significant decline in 2022. The Dynamic Revealed Comparative Advantage (DRCA) analysis further indicates that Indonesia held a "rising star" position during the 2011–2013 and 2017–2019 periods, but fell to the "lagging retreat" category in 2021–2023. This decline in competitiveness was driven by production instability, limited innovation, and quality standards that did not fully align with market requirements. To enhance the competitiveness of Indonesia's essential oil exports, strategic efforts are required particularly through technological innovation, quality improvement, and strengthened collaboration among stakeholders, including the government, farmers, and exporters. These measures are essential to improve global competitiveness and reinforce Indonesia's export position in the Chinese market.

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